

PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in or relating to Means for Lubricating Toothed Gears

We, ALFRED BOOTH, of St. Airedale Road, Claremont Estate, Pendleton, Salford, 6, in the County of Lancaster, a Subject of the King of Great Britain and Ireland, and WALLWORK GEARS LIMITED, of Union Bridge Iron Works, Roger Street, Red Bank, Manchester, 4, in the County of Lancaster, a Company incorporated under the Laws of Great Britain, do hereby declare the nature of this invention to be as follows:—

This invention relates to means for lubricating toothed gears.

Hitherto, toothed gears have been lubricated by partial or complete immersion in a bath of lubricant with the purpose of covering the working faces with lubricant and in some cases also extracting from the gears the heat generated when the gears are running. However when the gears are running at substantial speeds, the centrifugal effect is such as to resist the flow of lubricant to the said working faces; and at high speeds, the centrifugal effect becomes so great as to completely prevent the said flow. Consequently there is between the working faces a metal-to-metal contact which causes abrasion and wear of the working faces and the generation of much heat.

The object of our invention is to provide a novel means for lubricating toothed gears whereby the possibility of metal-to-metal contact at high speeds and therefore of abrasion and wear of the working surfaces is reduced and there is also a reduction in the amount of heat created by the gears and a cushioning and pressure equalizing effect is obtained between the driving faces.

Means for lubricating toothed gears in accordance with our invention comprises lubricant passages in the gear leading outwardly and arranged to deliver lubricant from the interior of the gear outwardly into the tooth gap or gaps thereof, whereby centrifugal effect assists in the delivery of lubricant into the tooth gap or gaps.

The lubricant passages preferably have their outlet orifices arranged on the bottom or root of the tooth gap or gaps or on the driving face of the tooth or each tooth,

there being at least one orifice in every tooth gap.

Where the outlet orifices are arranged in the bottom or root of the tooth gap or gaps, they are preferably positioned close to the working face of the tooth or each tooth and the passages are arranged to direct lubricant from the orifice direct on to the working face.

The inlet orifices of the passages are preferably in a feed passage or chamber provided centrally in the gear or shaft on which the gear is mounted and leading from one end of the shaft or gear at which place there is a continuous supply of lubricant.

The said supply of lubricant may be caused to flow to the lubricant passages by any suitable means.

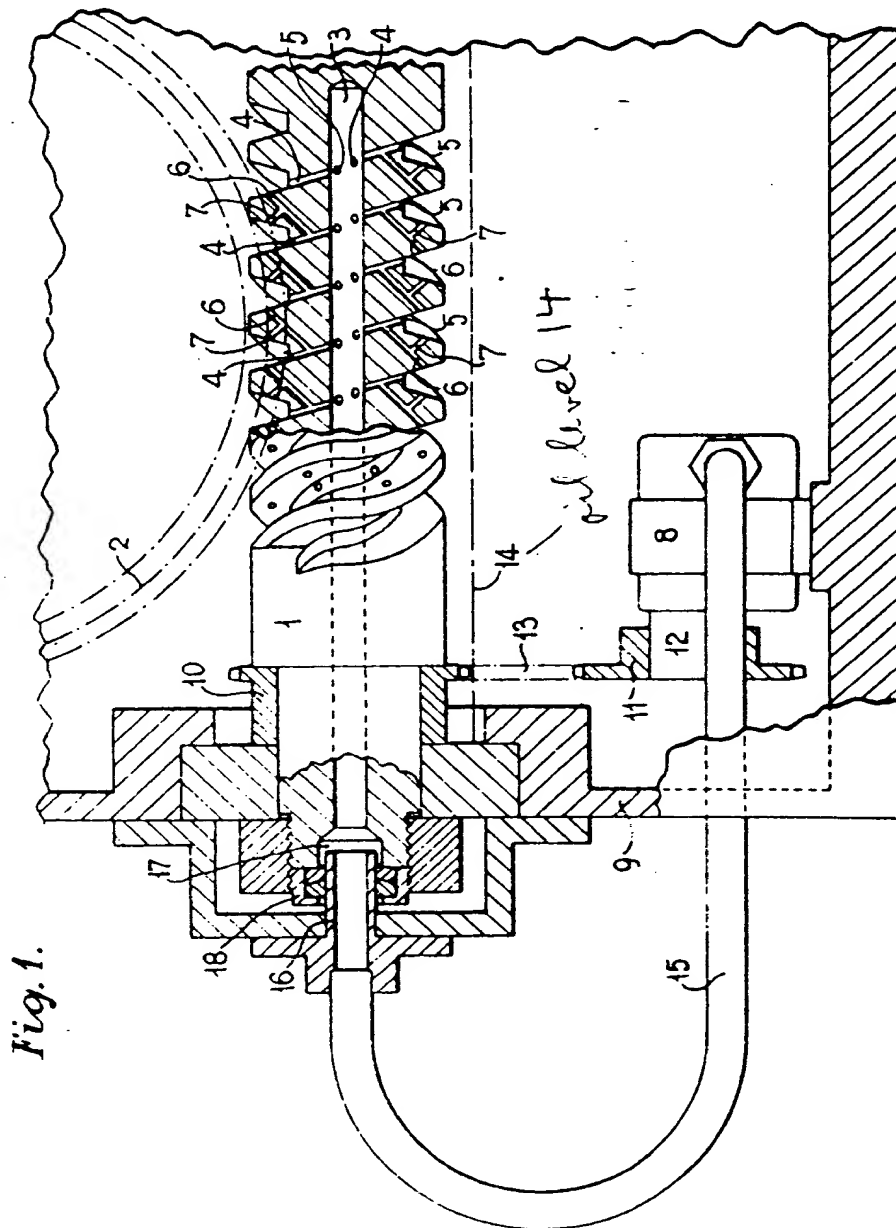
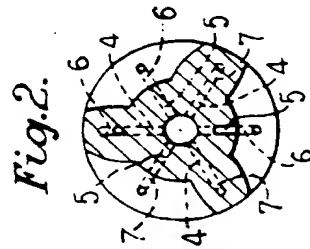
One suitable means consists in a lubricant receptacle in which a head of lubricant can be maintained, the receptacle being arranged to permit the flow of lubricant from it to the lubricant passages.

Another suitable means consists of a lubricant pump which pumps lubricant to the lubricant passages.

The said pump is preferably a centrifugal pump, the impeller of which is provided on the said shaft or the gear.

In one construction, as applied by way of example to a three-start worm meshing with a worm wheel, we provide the worm with an axial passage extending from one extremity of one of the two cylindrical ends of the worm centrally along the worm up to a point at or beyond the worm teeth. Leading from the axial passage there are a plurality of lubricant passages which lead to each of the three tooth gaps of the worm. The lubricant passages are preferably straight so that they can be readily produced by drilling. The lubricant passages have their outlet orifices disposed at the bottom or root of the tooth spaces. Each lubricant passage is in a plane which is parallel with the true profile of the tooth to which its orifice is adjacent. The outlet orifices of some of the lubricant passages are adjacent to the one working face of each tooth whilst the outlet orifices

[Price 1/-]



into the axial passage. A packing disc secured to the cover and cooperating with annular ribs provided on the end of the impeller to form a lubricant seal prevents lubricant which has been driven into the said port from escaping into the said conduit.

Dated this 11th day of November, 1942.

For the Applicants,
F. BOSSHARDT,
Chartered Patent Agent.

COMPLETE SPECIFICATION

Improvements in or relating to Means for Lubricating Toothed Gears

We, ALFRED BOOTH, of S. Alresford Road, Clarendon Estate, Pendleton, Salford, 6, in the County of Lancaster, a Subject of the King of Great Britain and Northern Ireland, and WALLWORK GEARS LIMITED, of Union Bridge Iron Works, Roger Street, Red Bank, Manchester, 4, in the County of Lancaster, a Company incorporated under the Laws of Great Britain, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to that kind of means for lubricating toothed gears wherein lubricant flows into an axial passage in one of the gears, and from thence through radial passages leading from the said axial passage to the gear gaps.

The object of our invention is to provide a novel means of the said kind for lubricating a worm and worm wheel gear whereby the possibility of metal-to-metal contact at high speeds and therefore of abrasion and wear of the working surfaces is reduced and there is also a reduction in the amount of heat created by the gears and a cushioning and pressure equalizing effect is obtained between the driving faces.

Means of the hereinbefore specified kind for lubricating a worm and worm wheel gear in accordance with our invention comprises an axial lubricant passage in the worm and a plurality of lubricant passages distributed axially along the worm so as to lead lubricant from the first named passage to each thread at different points along its length, means being provided to force into the first named passage lubricant from a sump to which the lubricant is returned after leaving the gear.

In order that our invention may be fully understood and more readily carried into practice, we have caused to be appended hereunto drawings illustrating a constructional example thereof, wherein:—

Figure 1 is a fragmentary front view, partly in section of a worm gear.

Figure 2 is a cross-sectional view of the worm shown in Figure 1.

Referring to the drawings, in the construction shown therein, as applied by way of example to a three-start worm 1 meshing with a worm wheel 2, we provide the worm 1 with an axial passage 3 extending from one extremity of one of the two cylindrical ends of the worm 1 centrally along the worm 1 up to a point at or beyond the worm teeth. Leading from the axial passage 3 there are a plurality of lubricant passages 4 and a plurality of lubricant passages 5 which lead to each of the three tooth gaps of the worm. The lubricant passages 4 and 5 are preferably straight so that they can be readily producing by drilling. The lubricant passages 4 and 5 have their outlet orifices disposed at the bottom or root of the tooth spaces. Each lubricant passage 4 and 5 is in a plane which is parallel with the face profile of the tooth to which its orifice is adjacent. The outlet orifices of the lubricant passages 4 are adjacent to the one working face of each tooth whilst the outlet orifices of the lubricant passages 5 are adjacent to the other working face so that lubricant flowing through the lubricant passages flows directly and continuously on to the said faces at the root thereof. There are a plurality of outlet orifices for each tooth gap. For example there may be six orifices for each turn of each tooth gap, the six orifices being arranged alternately adjacent the two working faces of the tooth gap as shown in the drawings.

Lubricant is forced into the axial passage 3 by any suitable means and flows from the axial passage 3 into and along the lubricant passages 4 and 5 radially or outwardly. The streams of lubricant flowing through the lubricant passages 4 and 5 escape therefrom at the bottom or root of the tooth gaps, and due to the direction of the lubricant passages 4 and 5 and the disposition of the outlet orifices of the lubricant passages 4 and 5, the streams flow continuously onto the working faces of the worm 1 at the roots thereof and, when not obstructed by the engaging parts of the worm wheel 2 the said streams flow continuously outwardly to the